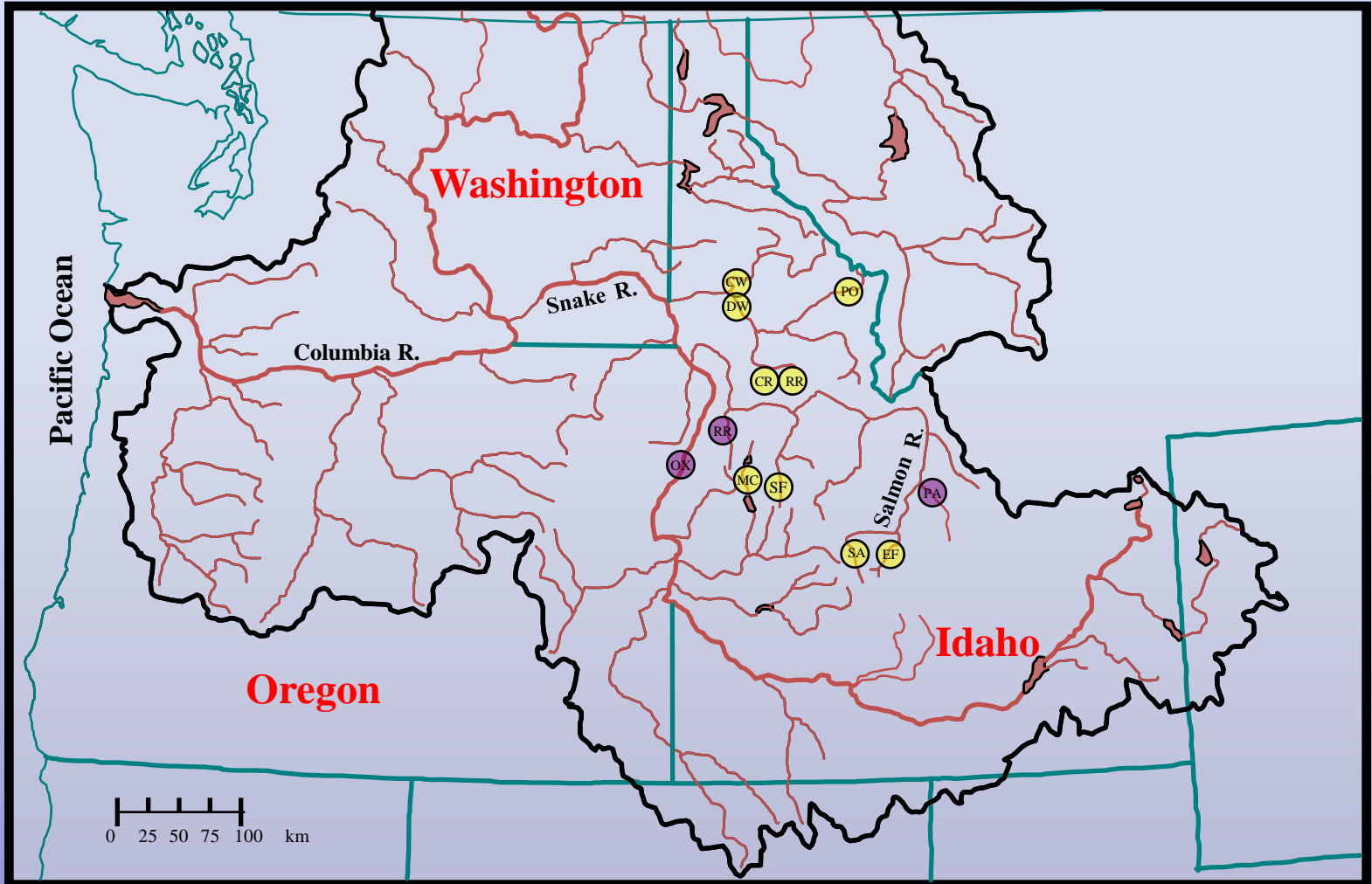


BENEFITS OF BKD MANAGEMENT TO IDAHO'S CHINOOK FACILITIES

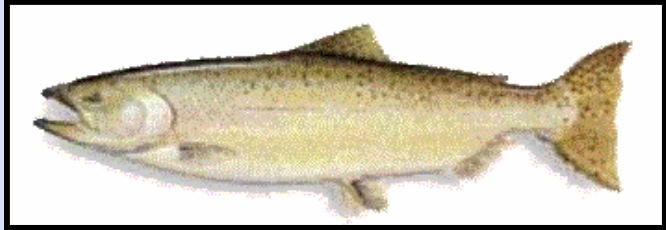


*BY A. DOUGLAS MUNSON , DR. MARILYN J. BLAIR,
SAM ONJUKKA, AND STEVE ROBERTS*

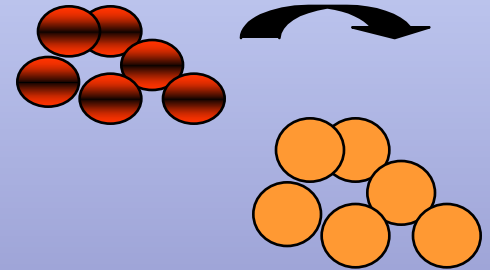
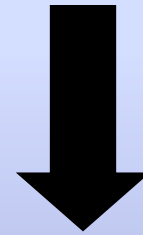
Background



ADULT INJECTIONS

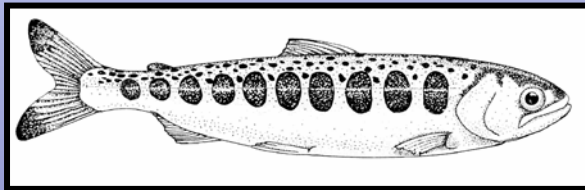
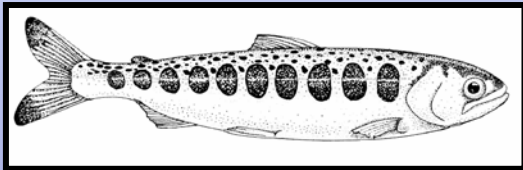
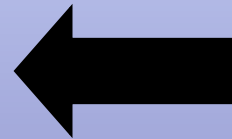


EGG DISINFECTION

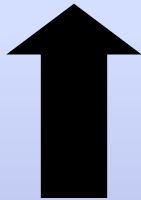


ELISA-BASED CULLING

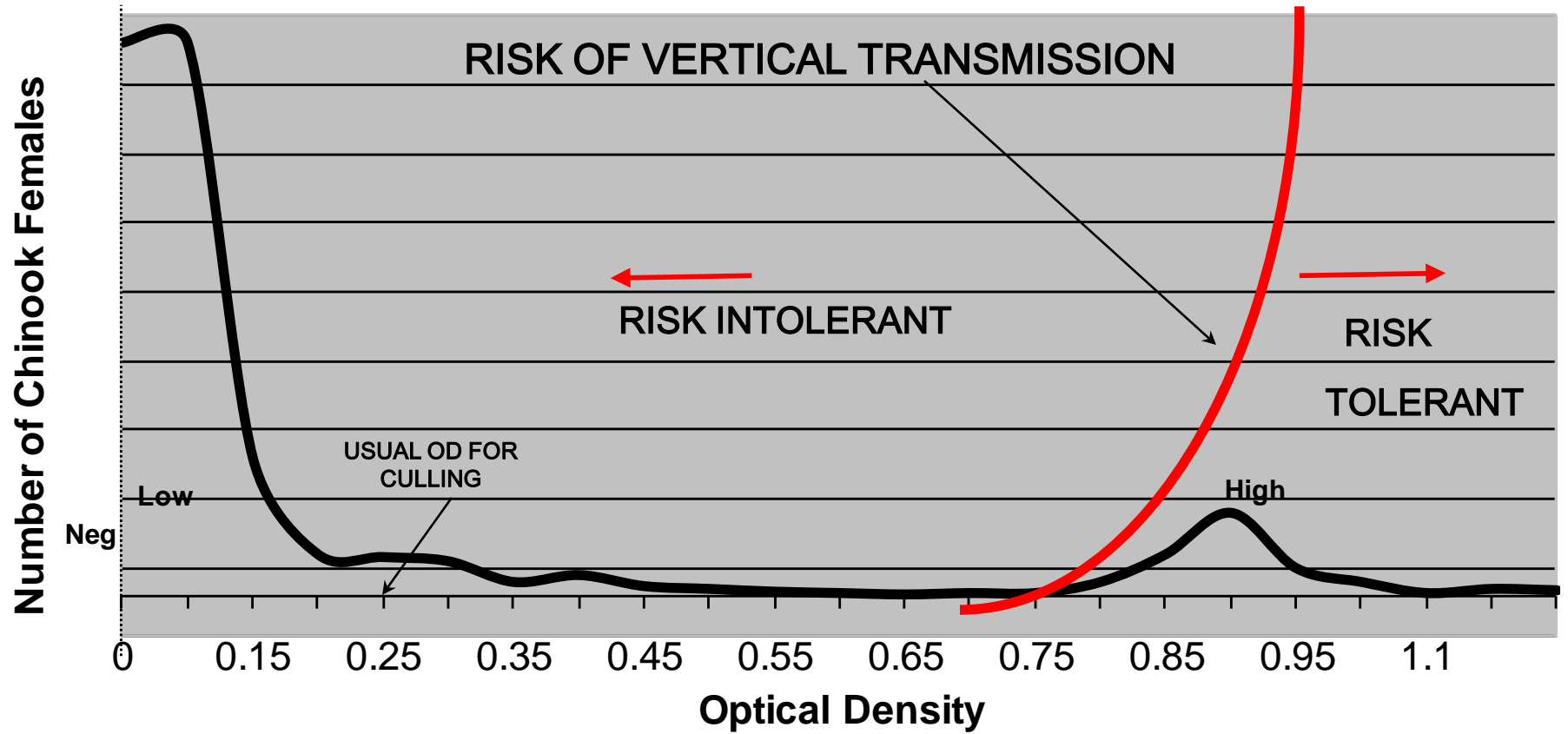
SEGREGATED RELEASES



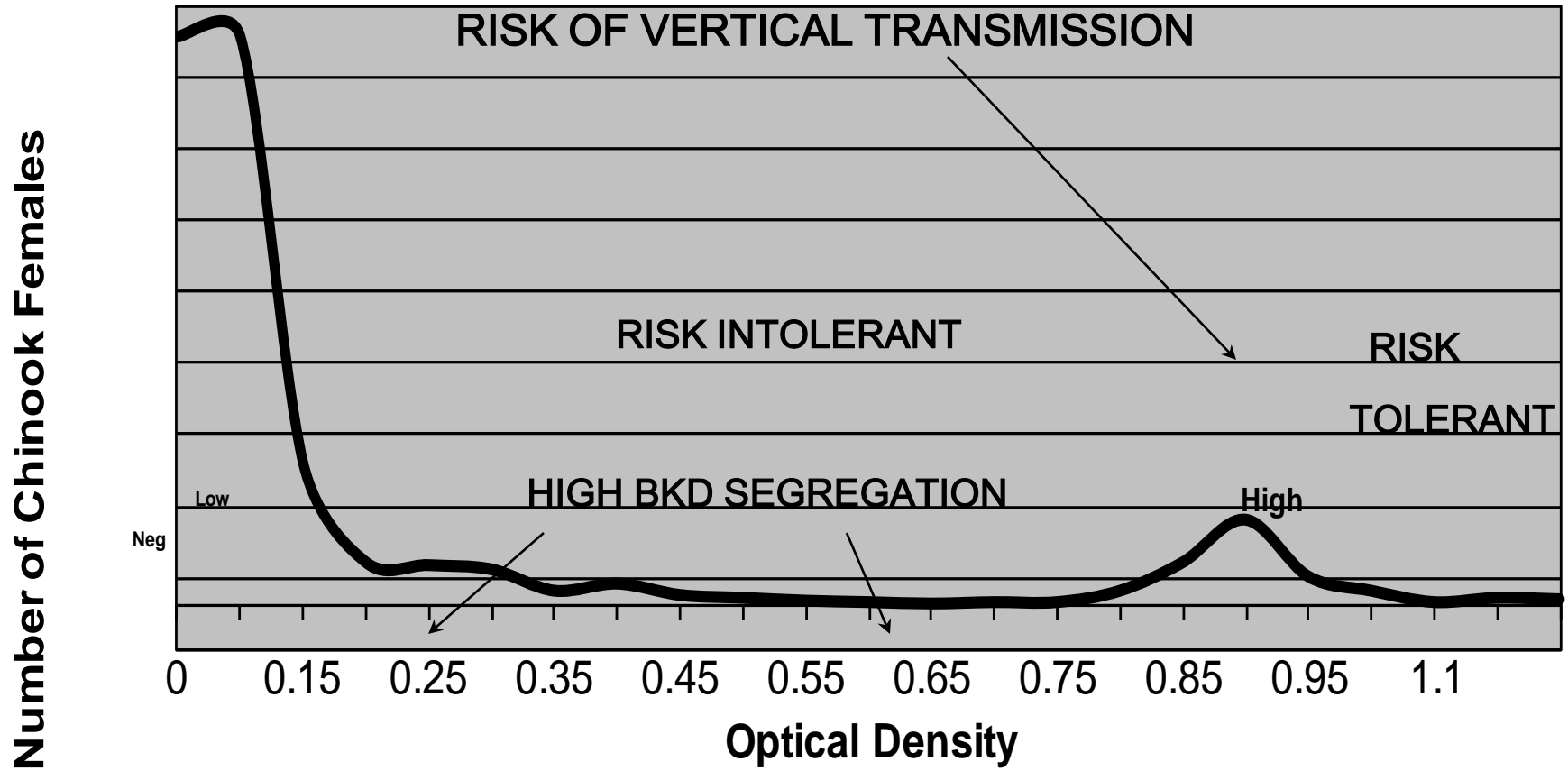
ERYTHROMYCIN MEDICATED FEED



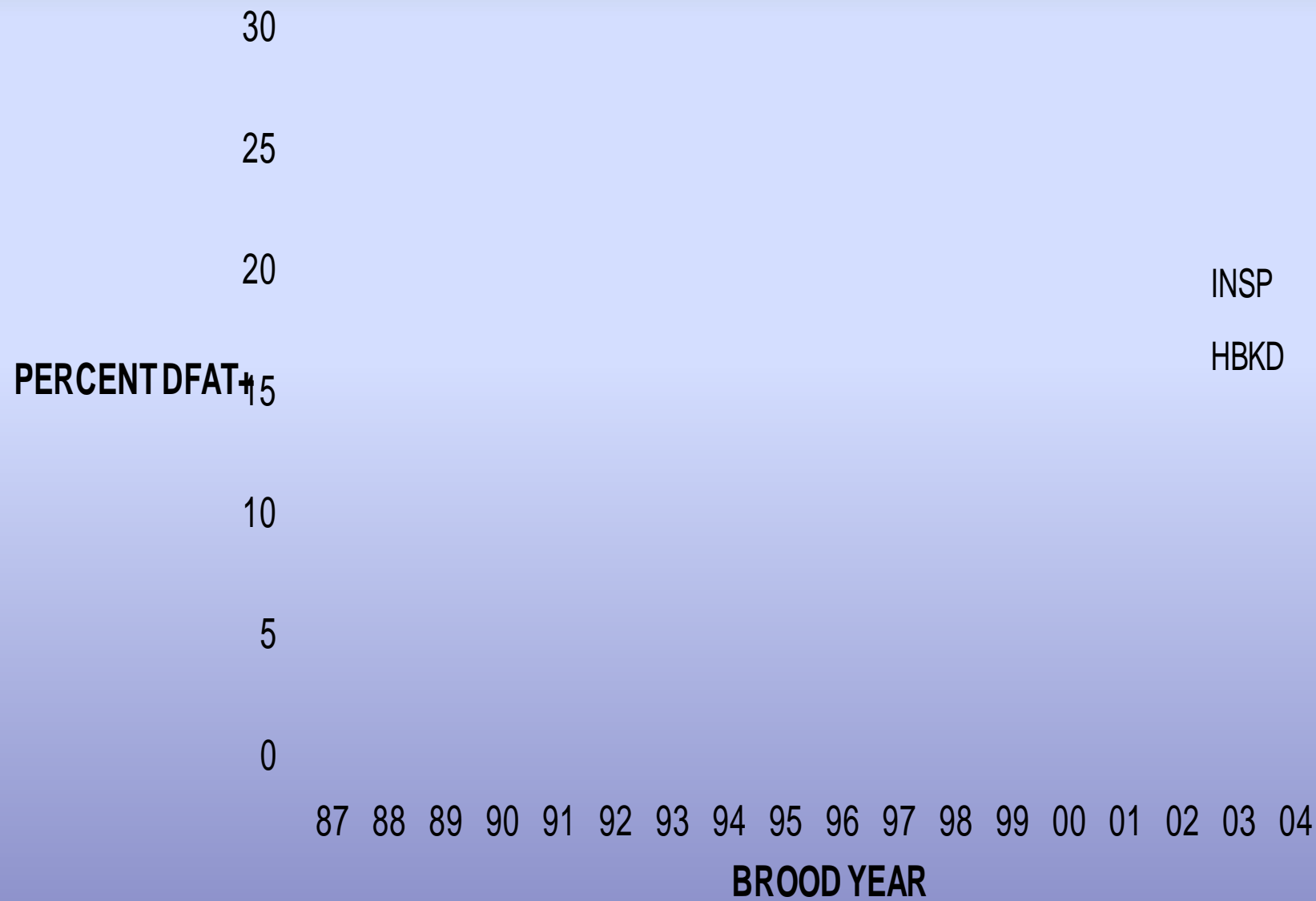
Selecting Culling/Segregation Cut-Off OD Values A Concept (Good KPL Antibody)



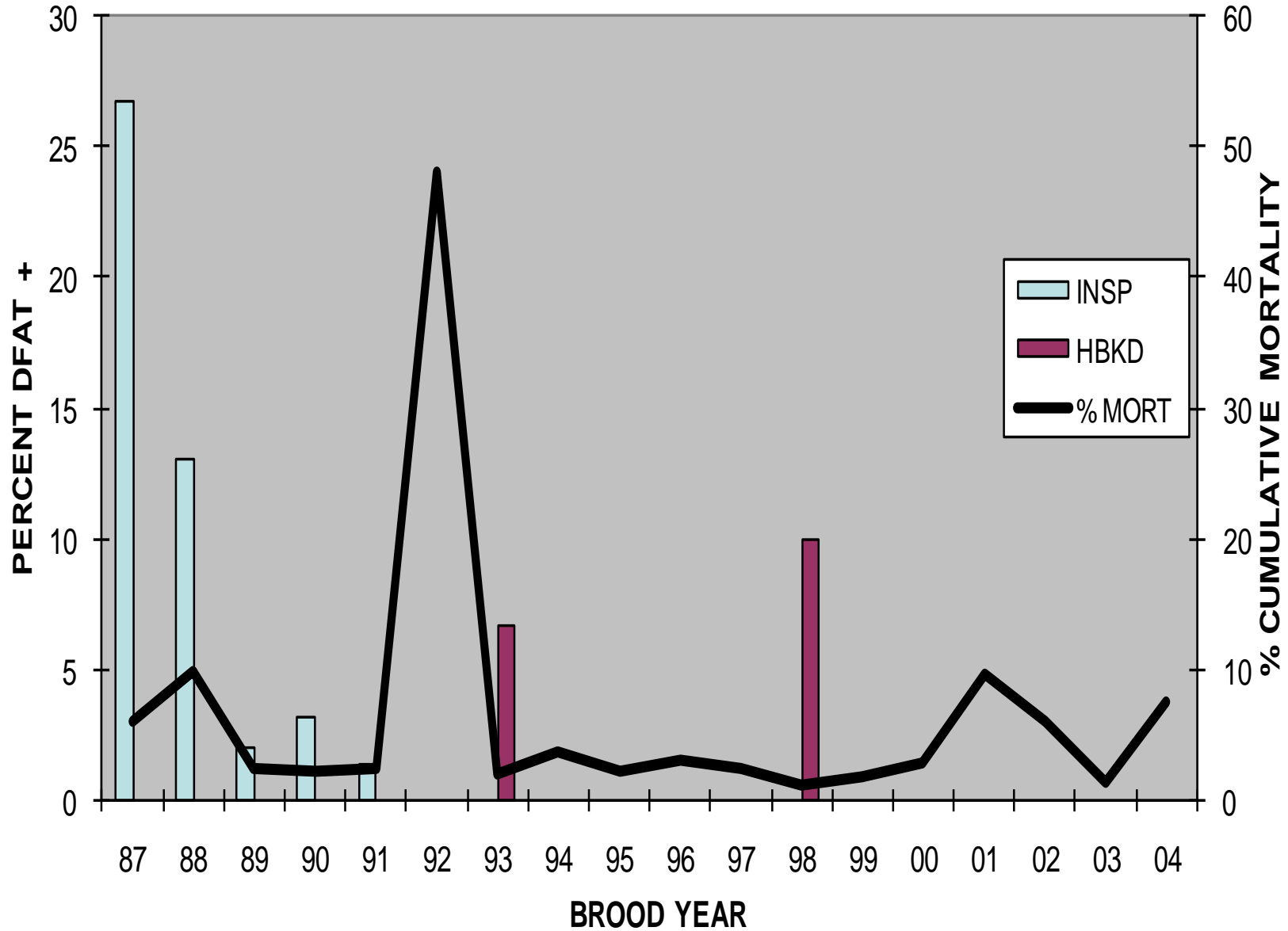
Selecting Culling/Segregation Cut-Off OD Values A Concept (Good KPL Antibody)



SAWTOOTH HATCHERY PRE-SMOLT SAMPLING

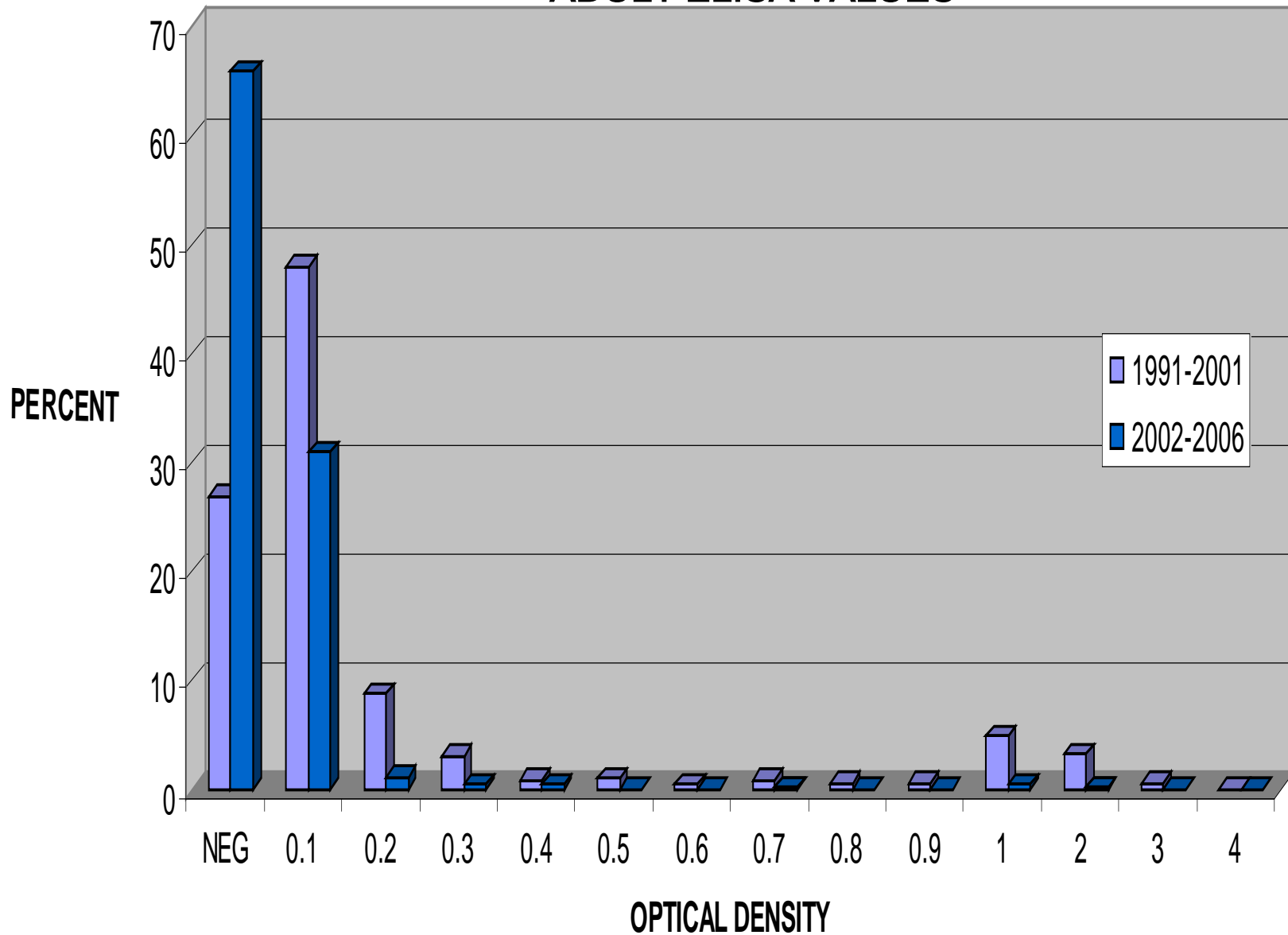


SAWTOOTH HATCHERY PRE-SMOLT SAMPLING



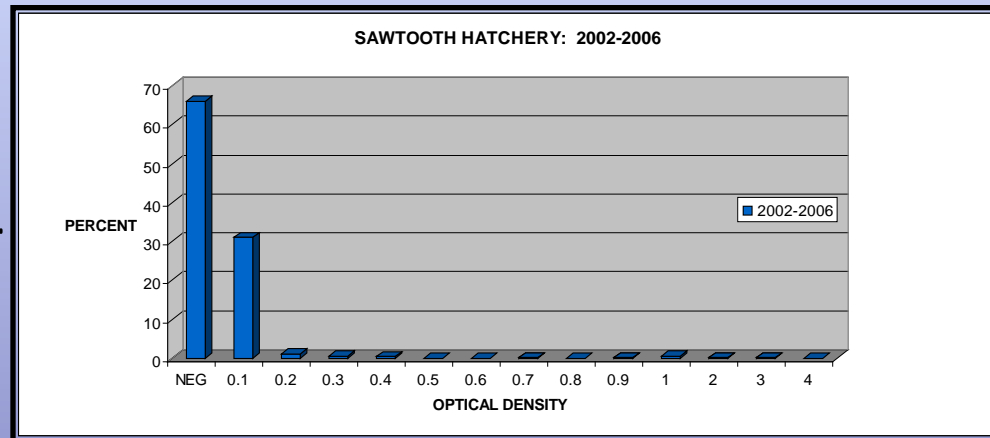
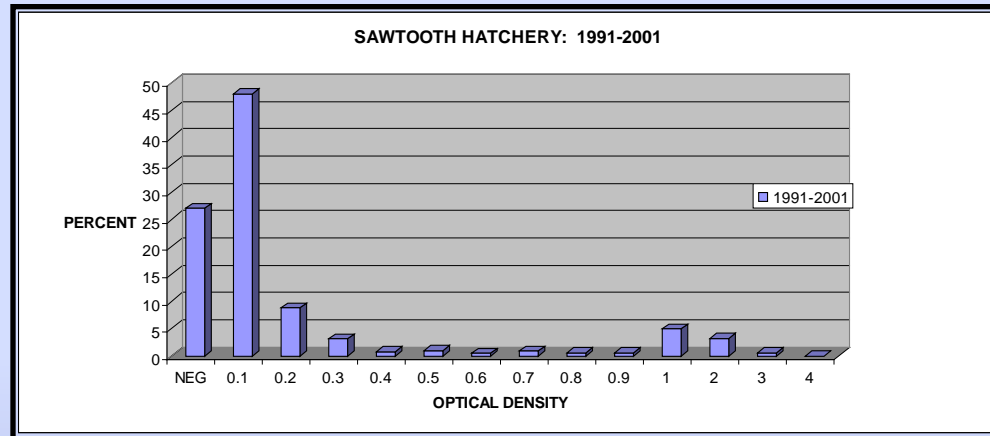
SAWTOOTH HATCHERY

ADULT ELISA VALUES

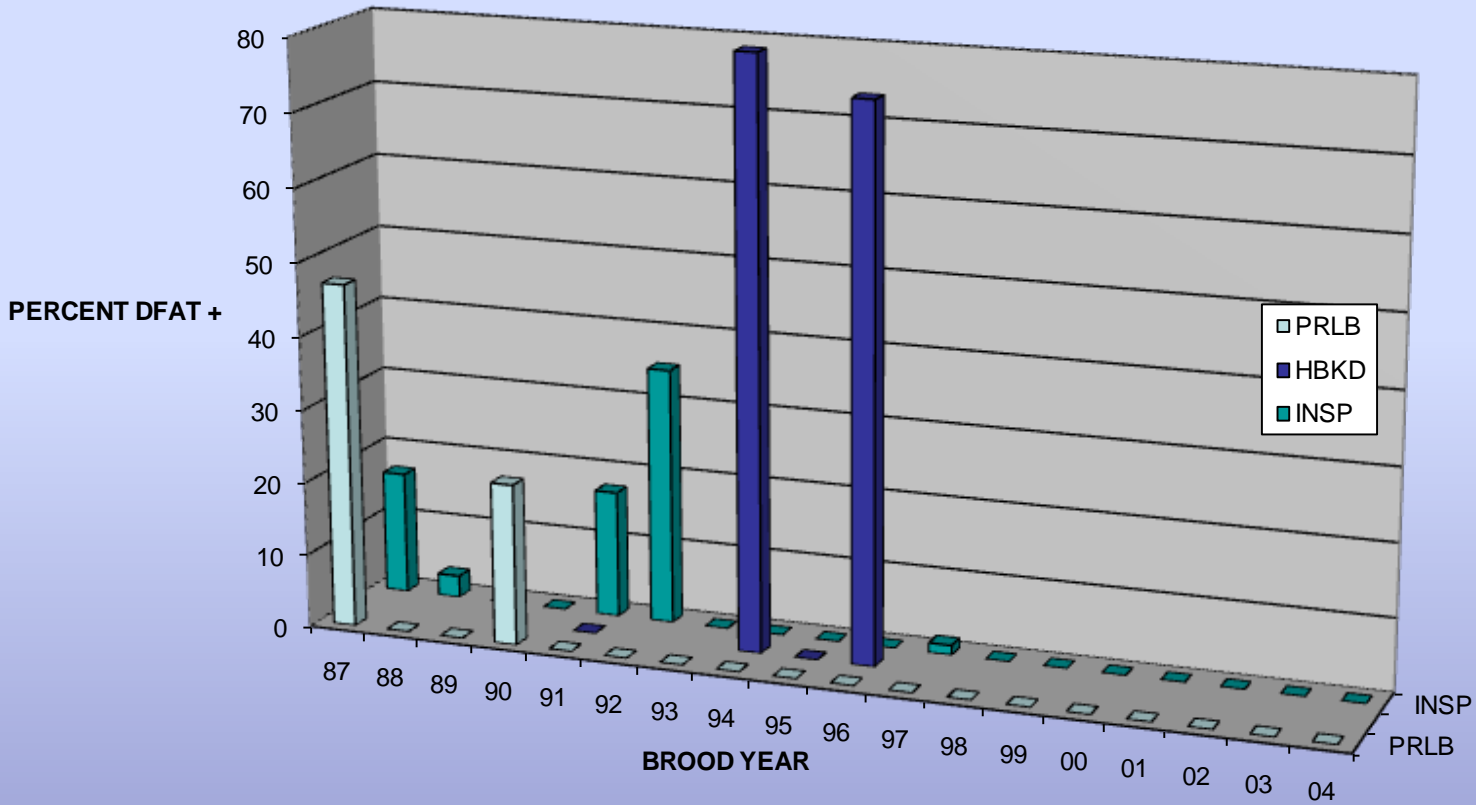


ADULTS AT SAWTOOTH HATCHERY: 1991-2006

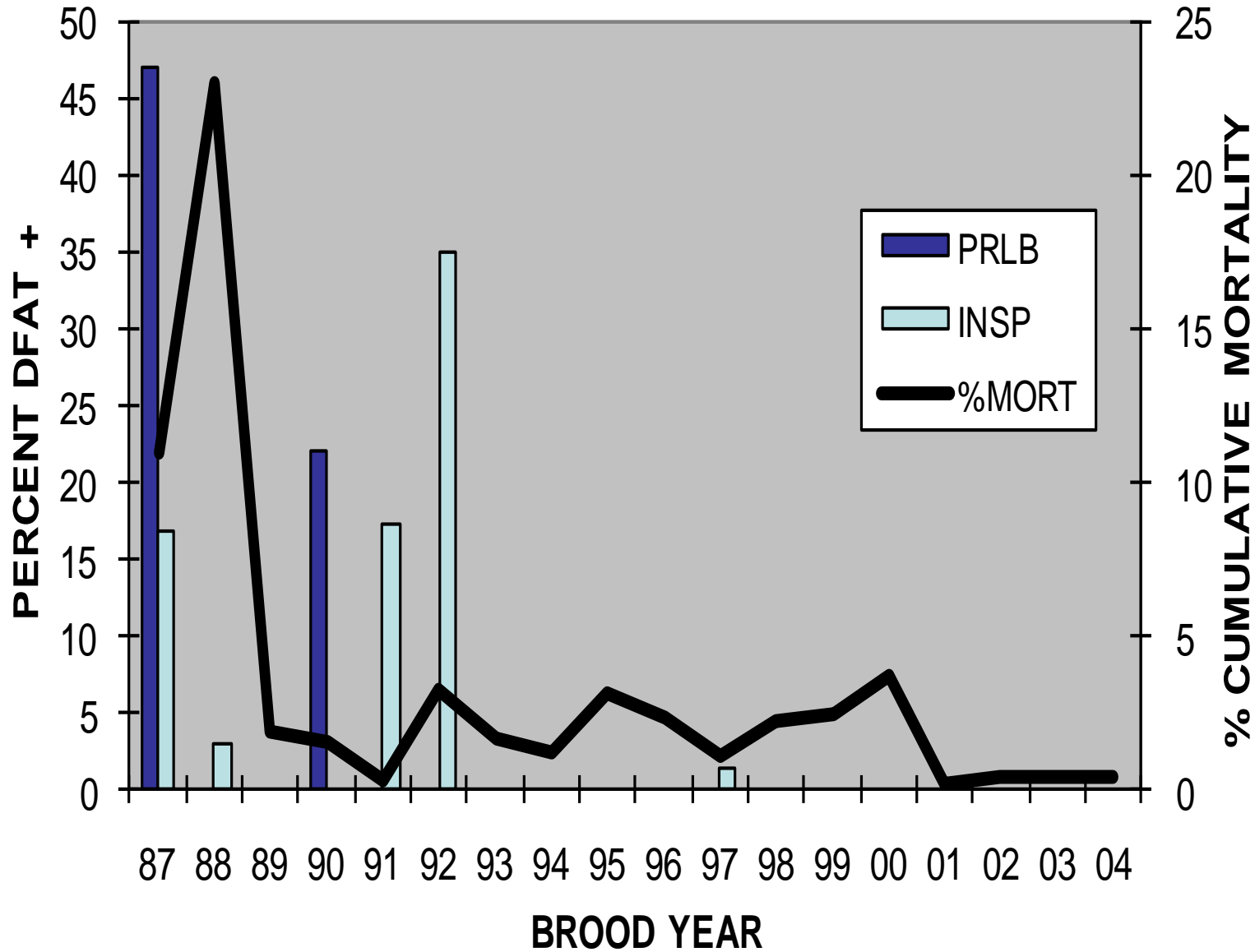
- INCREASE IN NUMBER OF FISH CATEGORIZED AS ELISA NEGATIVE AND LOW
- 1991-2001: 80 PERCENT OF FEMALES WITH ELISA OPTICAL DENSITIES BELOW 0.25
- 2002-2006: 98 PERCENT OF FEMALES WITH ELISA OPTICAL DENSITIES BELOW 0.25
- 1991-2001: 913 ADULTS 2002-2006: 1756 ADULTS



McCALL HATCHERY PRE-SMOLT SAMPLING: 1987-2004

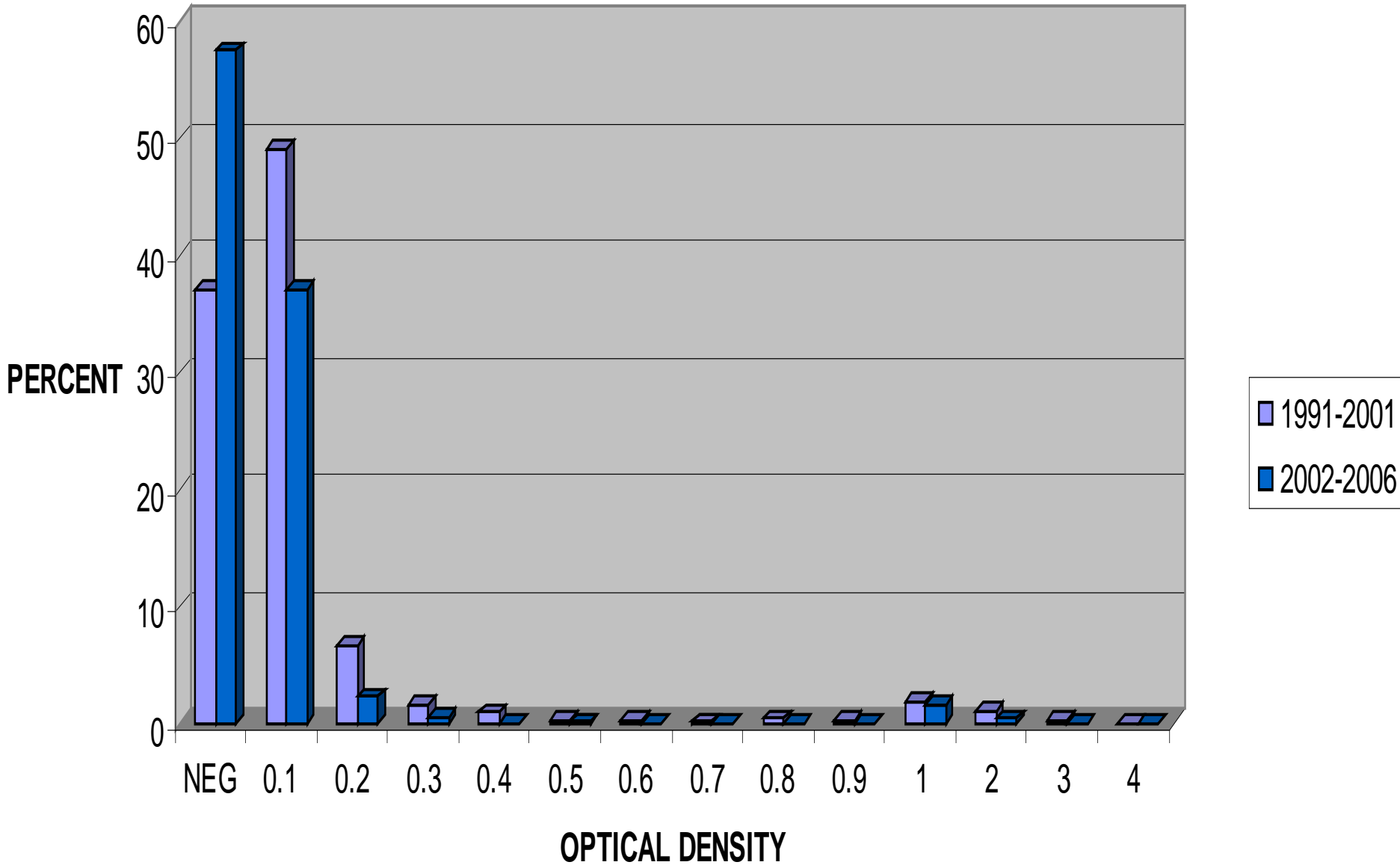


McCALL HATCHERY PRE-SMOLT SAMPLING



McCALL HATCHERY

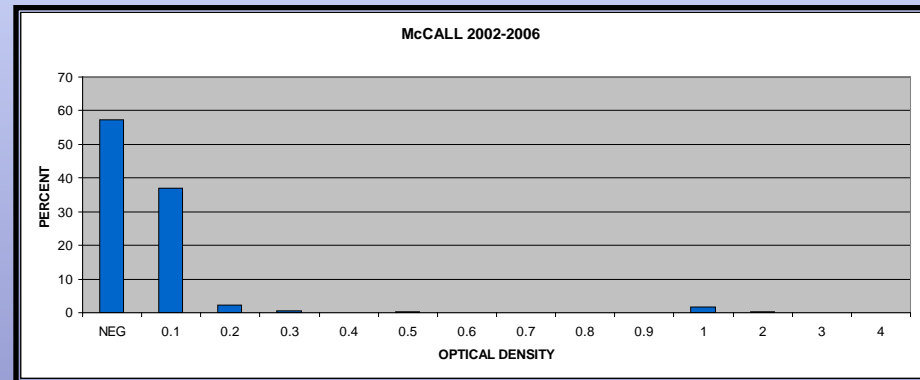
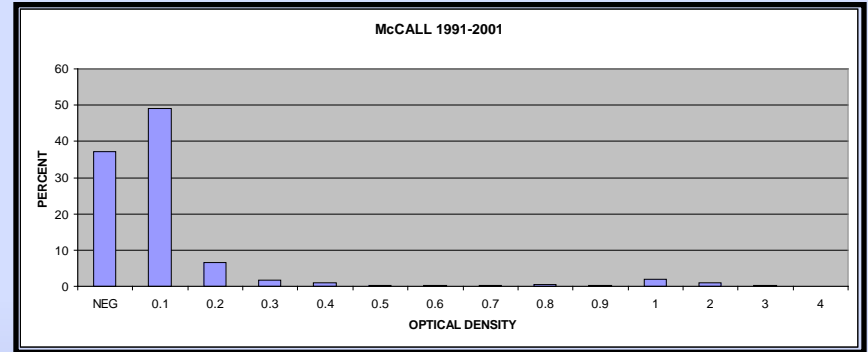
ADULT ELISA VALUES



ADULTS AT McCALL HATCHERY

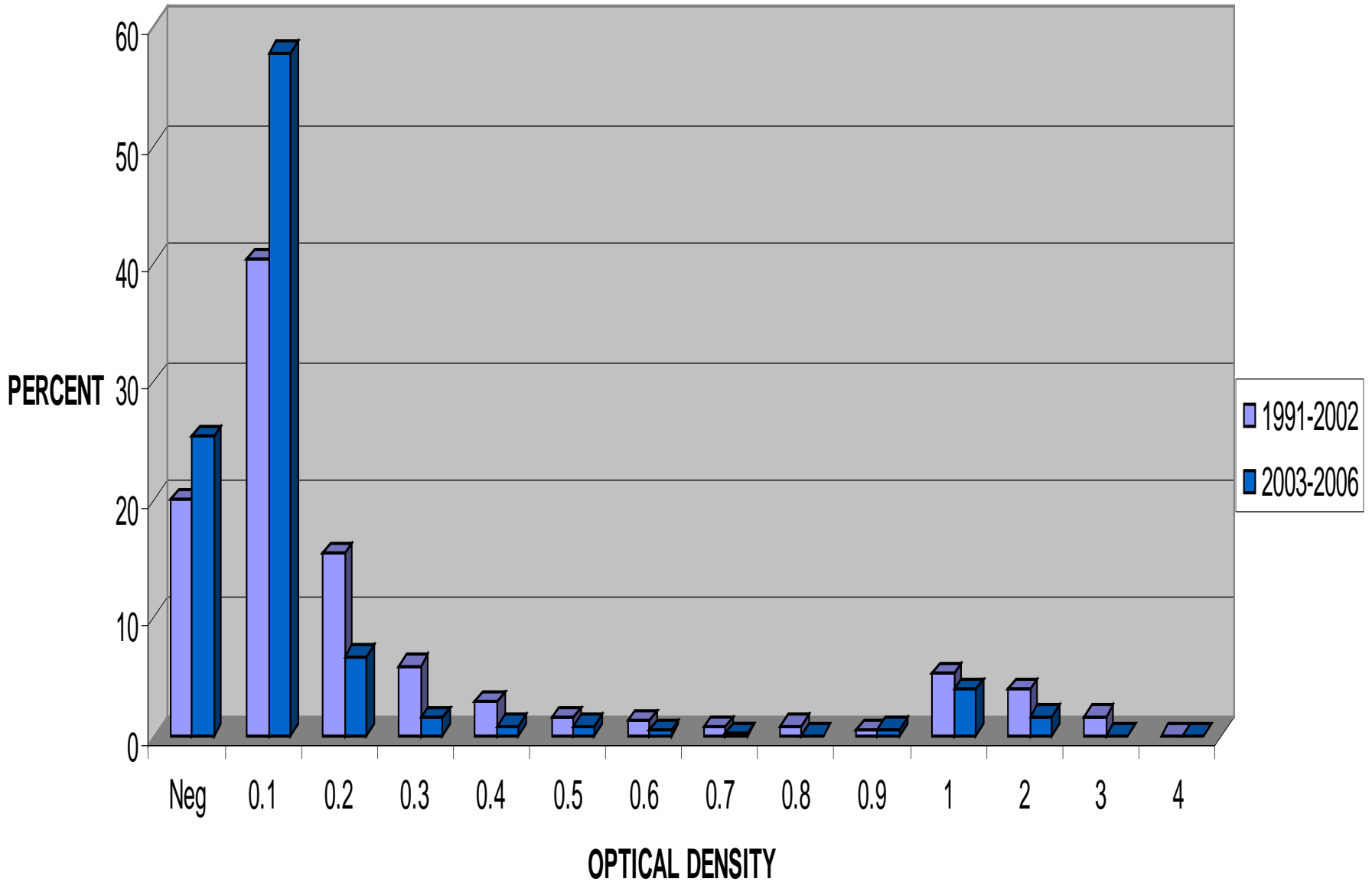
1991-2006

- INCREASE OF PERCENT OF FISH CATEGORIZED AS LOW AND NEGATIVE
- 1991-2001 93 PERCENT OF FISH WERE CATEGORIZED AS LOW OR NEGATIVE
- 2002-2006 95 PERCENT OF FISH WERE CATEGORIZED AS LOW OR NEGATIVE
- 1991-2001 3049 RETURNING ADULTS
- 2002-2006 11,948 RETURNING ADULTS



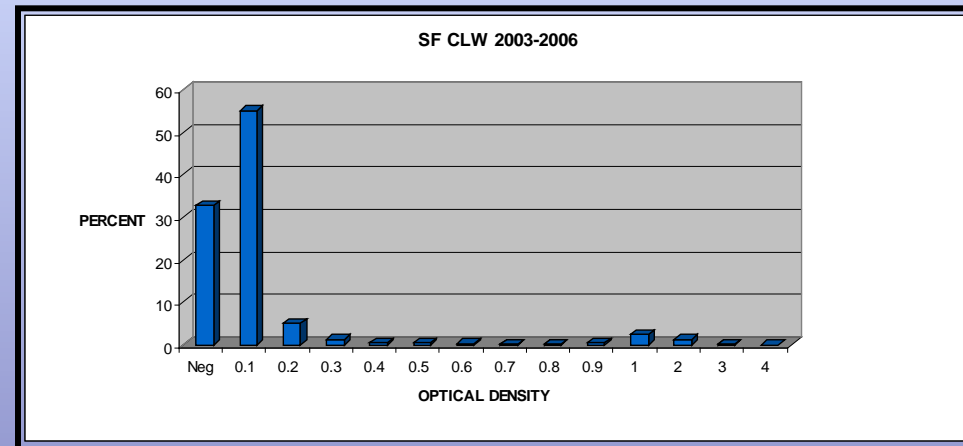
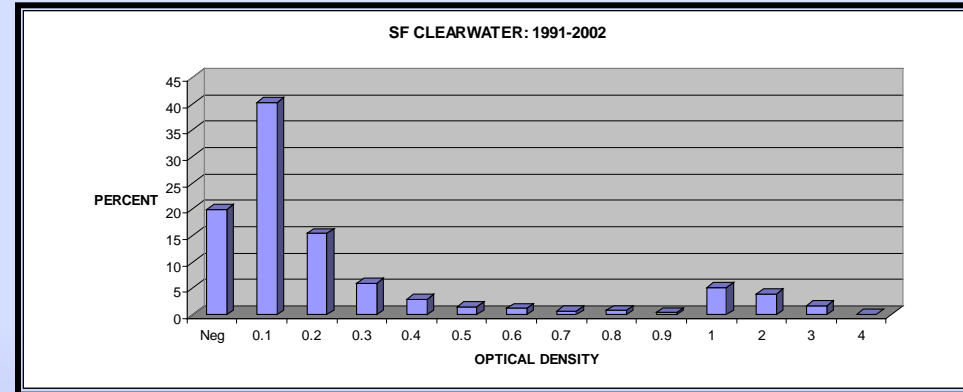
SF CLEAWATER:1991-2006

ADULT ELISA VALUES

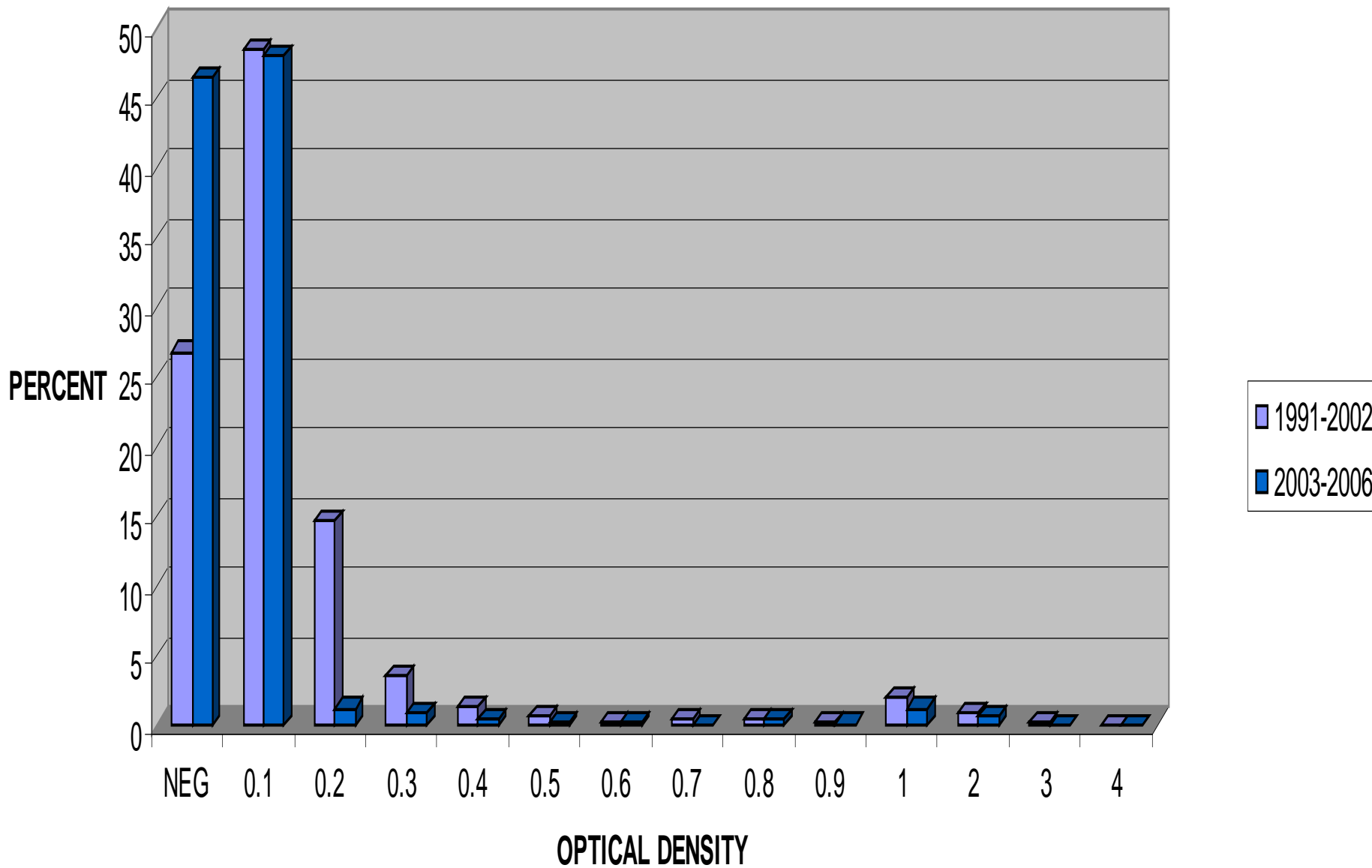


ADULTS AT CLEARWATER HATCHERY FROM SF OF THE CLEARWATER RIVER

- INCREASE IN NUMBER OF FISH CATEGORIZED AS ELISA NEGATIVE
- 1993-2002: 76 PERCENT OF FISH HAVE OPTICAL DENSITIES BELOW 0.25
- 2002-2005: 93 PERCENT OF FISH HAVE OPTICAL DENSITIES BELOW 0.25
- 1991-2001: 1740 ADULTS
- 2002-2006: 1892 ADULTS



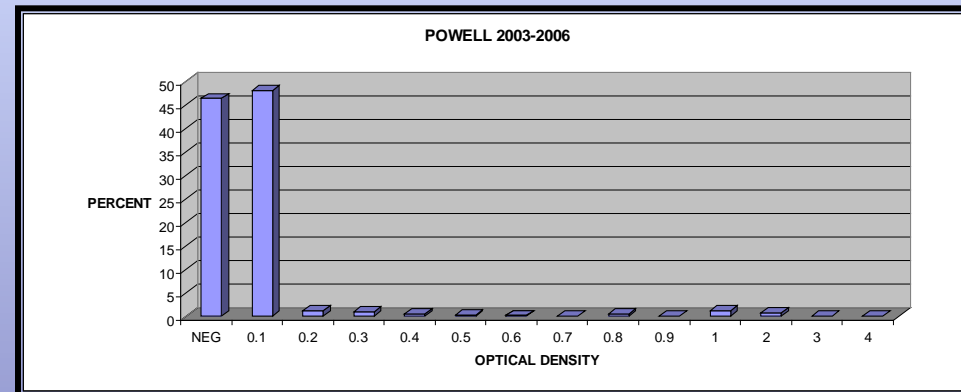
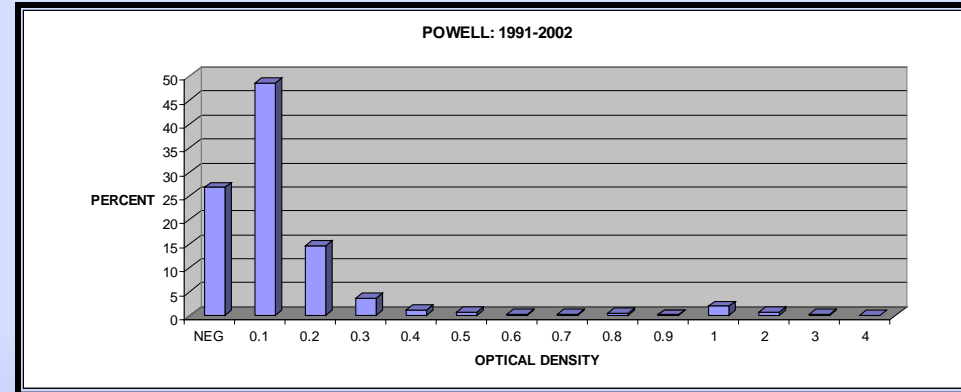
POWELL



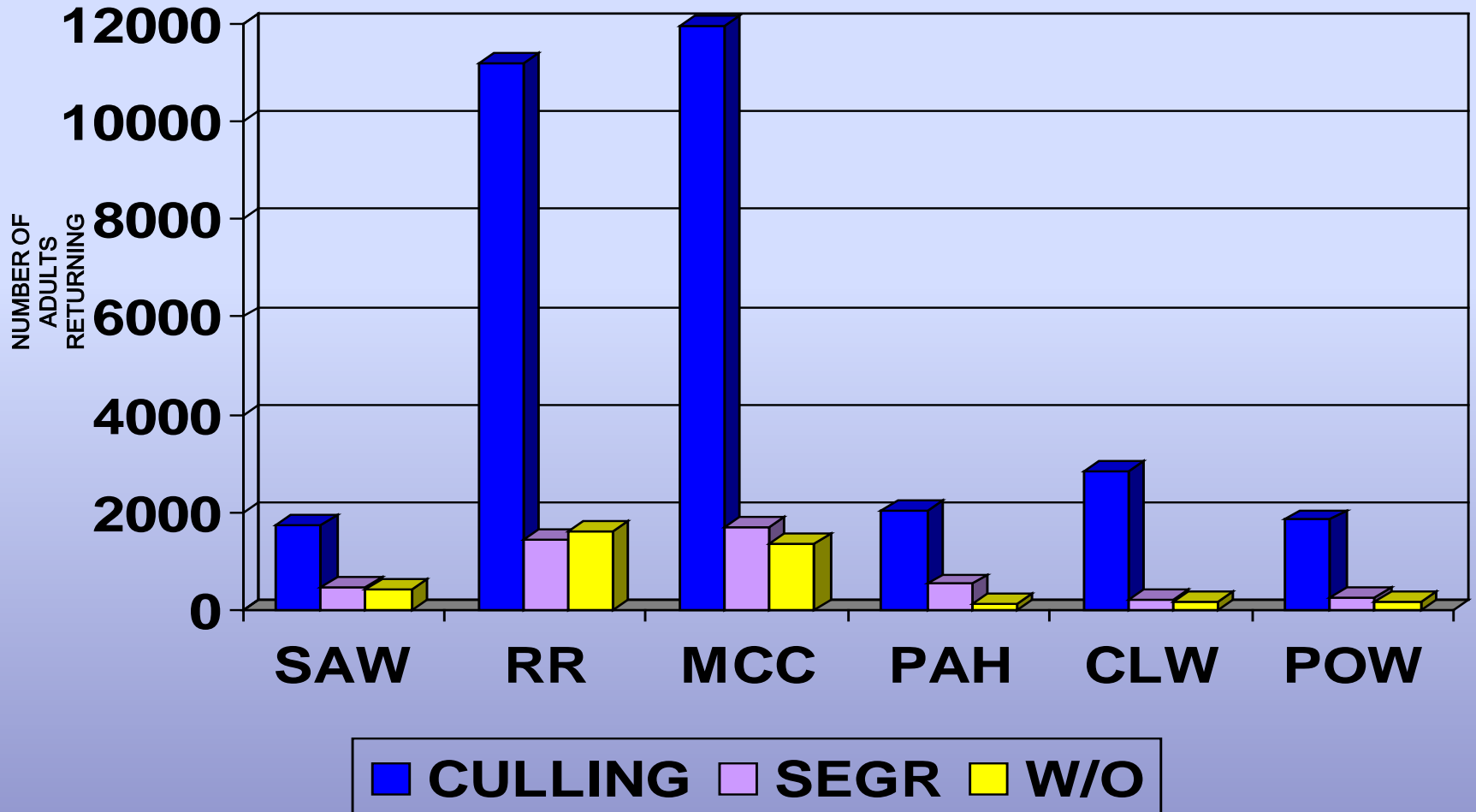
ADULTS AT POWELL SATELLITE

1991-2006

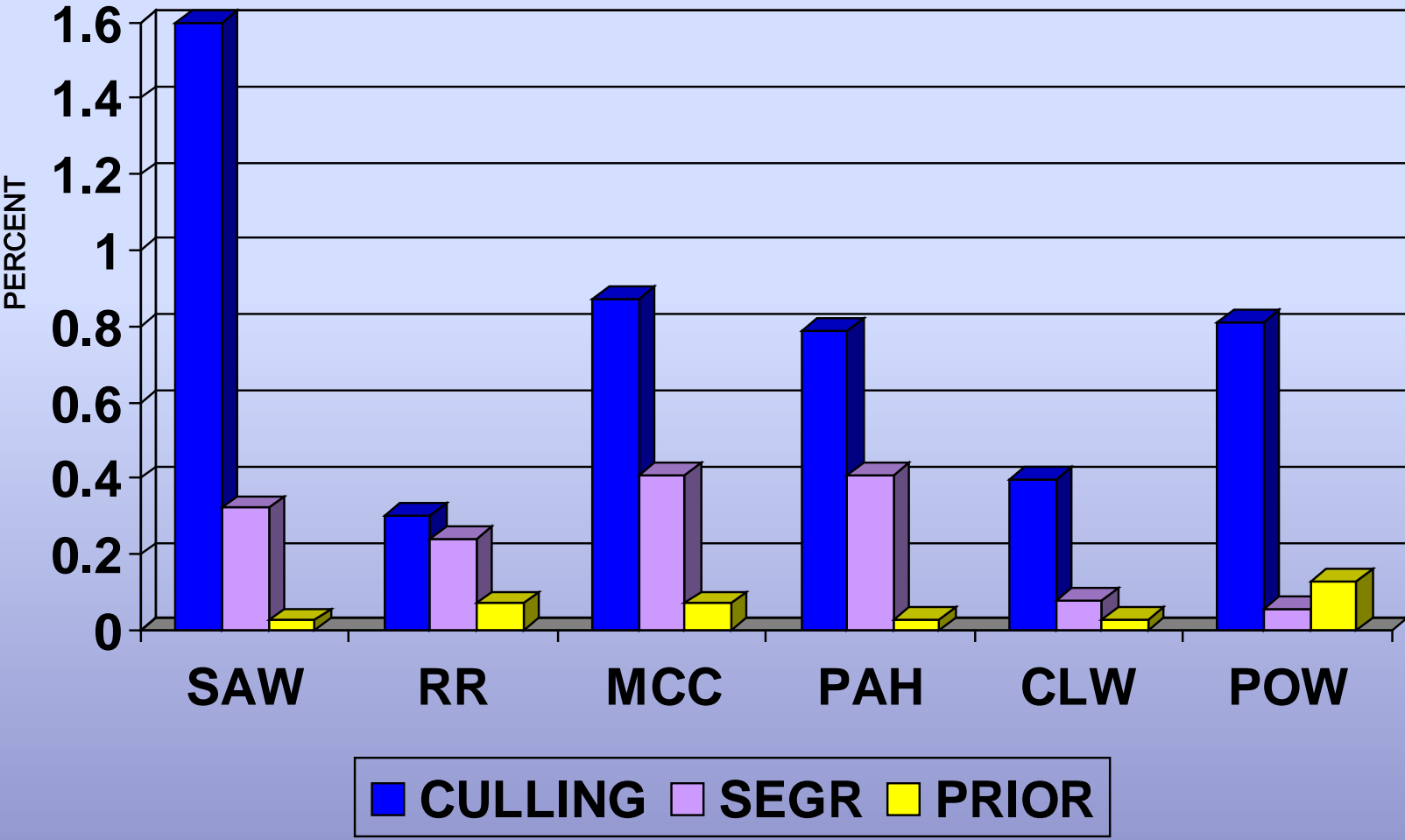
- INCREASE IN NUMBER OF FISH CATEGORIZED AS ELISA NEGATIVE
- 1991-2001: 90 PERCENT OF FISH HAVE OPTICAL DENSITIES BELOW 0.25
- 2002-2006: 96 PERCENT OF FISH HAVE OPTICAL DENSITIES BELOW 0.25
- 1991-2001: 2292 ADULTS
- 2002-2006: 1608 ADULTS



COMPARISON OF ELISA-BASED PROGRAMS BY CHINOOK SALMON ADULT RETURNS TO IDFG FACILITIES



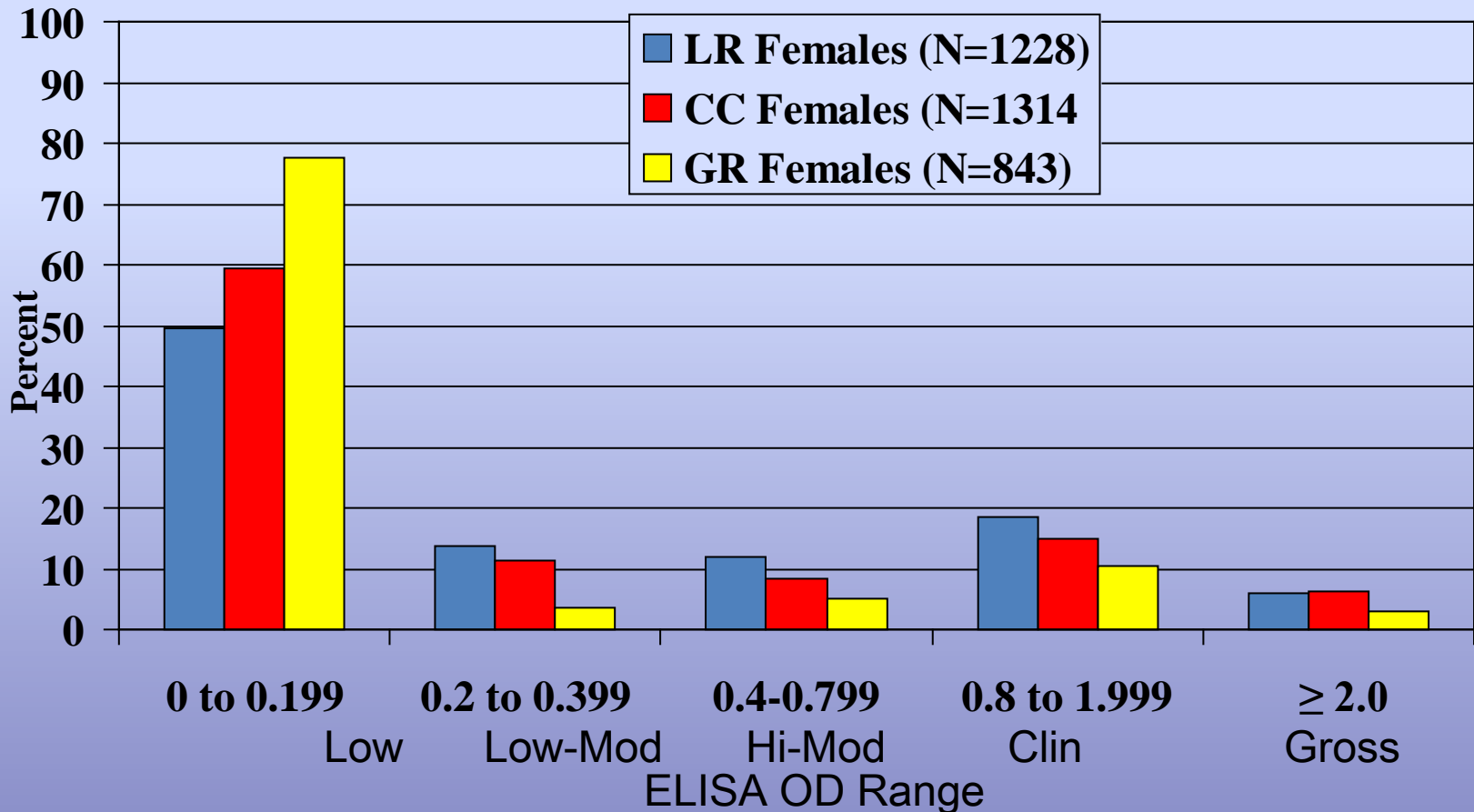
COMPARISON OF ELISA-BASED PROGRAMS BY SMOLT TO ADULT RETURNS TO IDAHO FISH AND GAME CHINOOK SALMON FACILITIES



**BKD MANAGEMENT OF OREGON SPRING CHINOOK CAPTIVE
BROODSTOCK PROGENY REARED
AT LOOKINGGLASS HATCHERY**

**Sam Onjukka
ODFW – Fish Health Services
Eastern Oregon University, La Grande, Oregon**

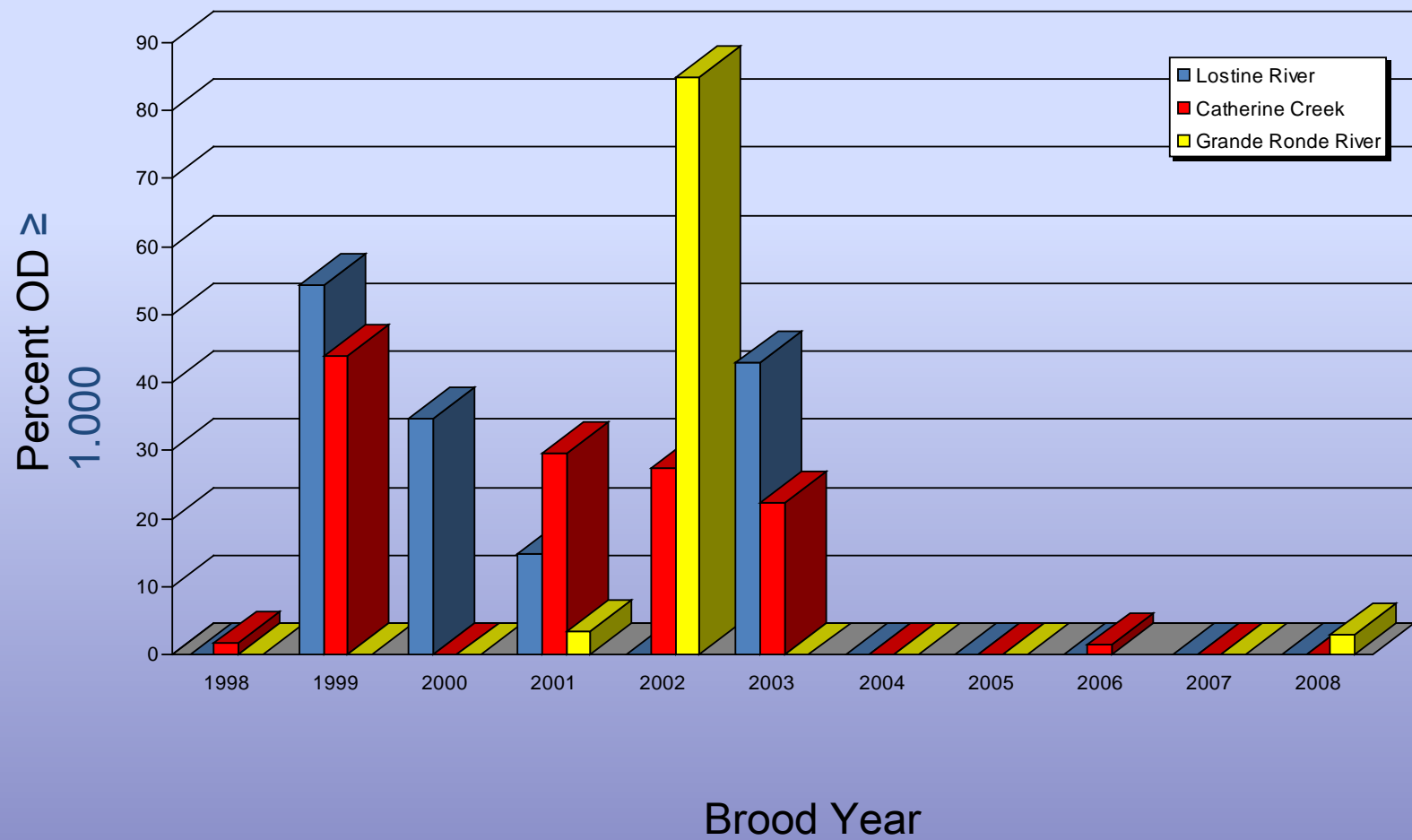
ELISA OD Distribution for Oregon Captive Broodstock Females Surviving to Maturity 1998-2009



**BKD Management for Lostine River, Catherine Creek and Grande Ronde
BY98-2009 Captive Brood Progeny Reared at Lookingglass**

<u>Brood Year</u>	<u>LR Cull OD Level</u>	<u>CC Cull OD Level</u>	<u>GR Cull OD Level</u>	<u>Comment</u>
1998	None	None	None	1 st yr. low production
1999	2.0*	2.0*	None	*Not all culled >2.0
2000	0.8	0.2	0.2	
2001	0.8	0.2	0.2	
2002	0.8	0.4	None*	*All GR reared including BKD highs
2003	0.8	0.8	> 0.620*	*1 of 2 GR females
2004	0.8	0.8	0.2	
2005	0.4	0.8	0.8*	*1.009 GR female kept
2006	0.4	0.8	N/A*	*No GR F ₁ 's to smolt
2007	0.2	0.8	0.8	
2008	0.2	0.2	0.2	
2009	0.2	0.4	0.2	

Juvenile ELISA Detections (OD \geq 1.000) in mort/moribund Captive Broodstock Progeny at Lookingglass Hatchery



Bacterial Kidney Disease

...dead fish don't return!

Management - Chinook Salmon

Steve Roberts

Washington Department Fish & Wildlife

Fish Health Specialist, March, 2007

BKD Management Tools

- Pre-spawning adult antibiotic injections
- Adult female BKD screening – destruction and/or segregation
- Preventative antibiotic feedings

Case Studies:

- Priest Rapids Fall Chinook
- Tucannon Spring Chinook
- Lyons Ferry Fall Chinook

Priest Rapids Fall Chinook

- **Program:** 6.7 M sub-yearlings
- **BKD Management:** None

Priest Rapids Falls Chinook

- **Outcome:**
- No history of BKD
- BKD-ELISA testing (1994 – 96) < 1.0 %
females with O.D. > 0.2

Tucannon Spring Chinook

- **Program:** 132 K yearling smolts
- **BKD Management:**
 - 1. Adult erythromycin injections
 - 2. **Adult female BKD screening – no segregation or destruction**
 - 3. Single erythromycin feeding

Tucannon Spring Chinook

- **Outcome:**
- BKD-ELISA adult testing (1992 to present): < 6.5% females with O.D. > 0.2
- Little annual variation in adult BKD-ELISA
- Minor BKD losses in juveniles – Out of last 10 broodyears - only 2000 & 2002 broodyear.

Lyons Ferry Fall Chinook

- **Program:** 900 K yearling smolts and 4.8 M sub-yearling smolts
- **BKD Management:**
 - 1. Adult erythromycin injections
 - 2. Adult female BKD screening – selection of progeny from BL females for yearlings. Mixed and untested females in sub-yearlings
 - 3. Single erythromycin feeding

Lyons Ferry Fall Chinook

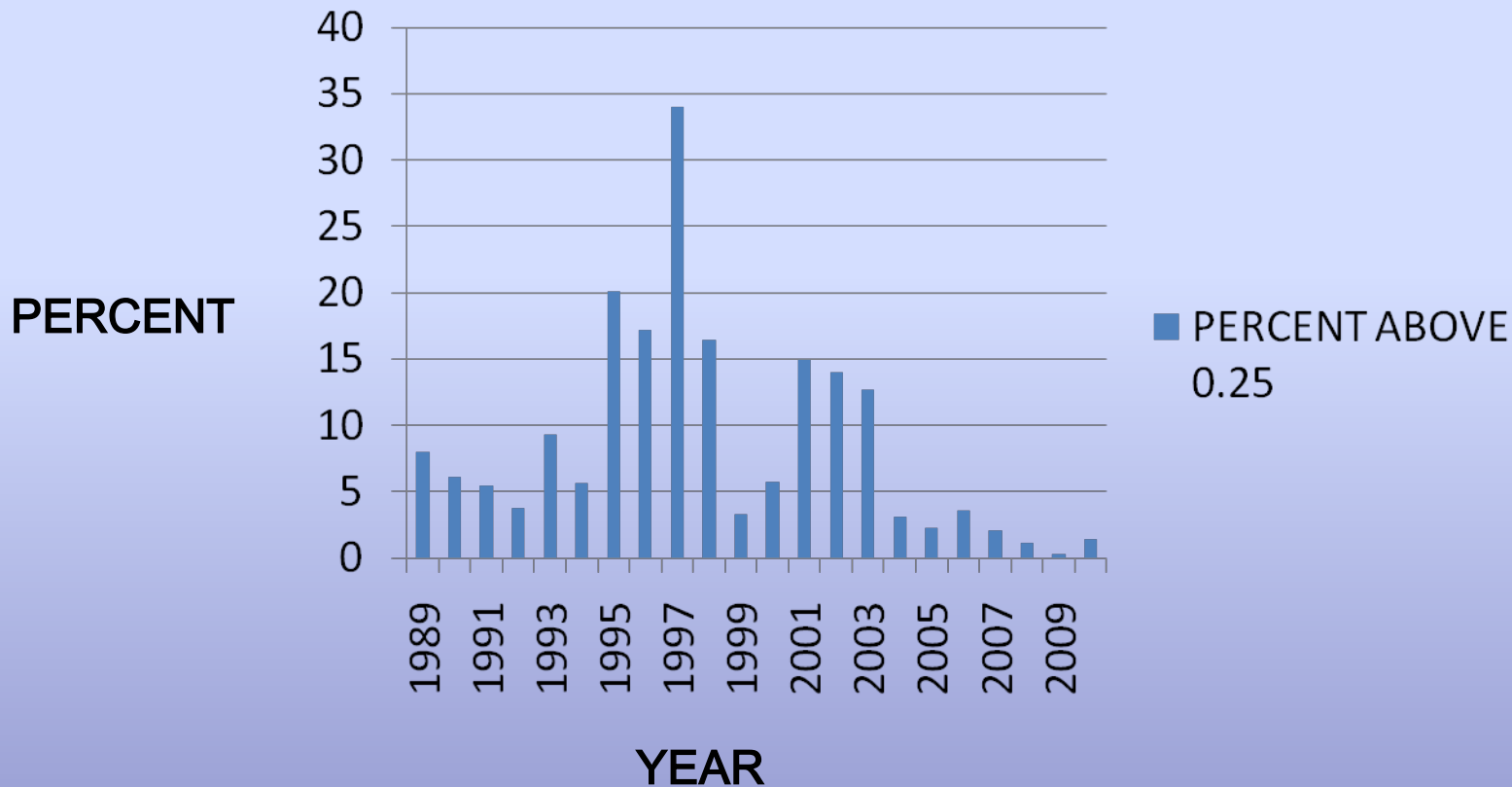
- **Outcome:**
- BKD-ELISA adult testing (1991 to present): < 6.4% females with O.D. > 0.2
- Some minor annual variation in adult BKD-ELISA
- Some BKD outbreaks in yearlings
- No BKD outbreaks with sub-yearlings

Summary

- Bacterial kidney disease management is customized for chinook salmon stocks and rearing programs

DWORSHAK-KOOSKIA ADULT CHINOOK SALMON ELISA TREND

PERCENT ABOVE 0.25



CONCLUSIONS

- **HATCHERY MANAGEMENT PLAYS A CRITICAL ROLE IN PREVENTING BKD TRANSMISSION**
- **THE POSITIVE AFFECTS OF ELISA-BASED CULLING (IDFG):**
 - NO BKD EPIZOOTICS
 - REDUCED PRE-SMOLT MORTALITY
 - DECREASED ELISA OD VALUES IN ADULTS IN 3 GENERATIONS
 - IMPROVED SARs

CONCLUSIONS continued

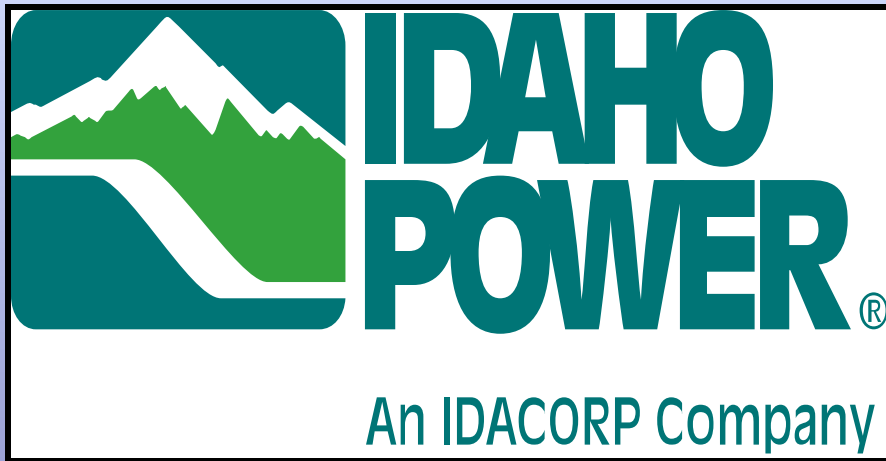
- **INTUITIVELY HATCHERY OUT-MIGRANTS WITH LOWER LEVELS OF *RENIBACTERIUM* POSE LESS RISK OF HORIZONTAL TRANSMISSION TO WILD/NATURAL SALMON DURING COLLECTION AND TRANSPORTATION**

BECAUSE OF THE SUCCESS OF THE ELISA PROGRAM

- **BOTH CLEARWATER AND McCALL HATCHERIES DO NOT FEED ERYTHROMYCIN MEDICATED FEED**
- **ALL OTHER CHINOOK HATCHERIES FEED ONLY 1X**
- **McCALL HATCHERY DOES NOT INJECT ERYTHROMYCIN INTO RETURNING ADULT CHINOOK**
- **CLEARWATER HATCHERY IS ANALYZING INJECTION VS NON-INJECTION ADULT CHINOOK OPTICAL DENSITIES**
- **DISCUSSING RESEARCH PROJECT AT SAWTOOTH HATCHERY : IMPACTS OF REMOVAL OF ERYTHROMYCIN MEDICATED FEED TREATMENTS.**

ACKNOWLEDGEMENTS

- THE STAFFS AT IDFG CHINOOK HATCHERIES
- THE TEAM AT EFHL



QUESTIONS?

